REMARKS

In section 2 and 3 of the Office Action, the Examiner rejected claims 30-44 under 35 U.S.C. §112, second paragraph, as being indefinite.

In reading the objections to independent claim 30 as recited in the Office Action, it becomes clear that the Examiner's real objection is that, in the opinion of the Examiner, independent claim 30 is too broad. For example, the Examiner wants applicant to narrow independent claim 30 by limiting the orthodontic treatment to determining distances and direction of tooth movement, to finding existing space between teeth, to using the discrepancies in a particular way, to specifying an objective and a use for the obtained values, and to defining the discrepancies more precisely.

Thus, the Examiner is in effect using this rejection as an additional art rejection because all of these objections go to the scope of coverage rather than clarity of independent claim 30. Indeed, these objections ultimately have nothing to do with the clarity of the claim because those skilled in the art surely would know how to plan an orthodontic treatment given the information specified in independent claim 30.

Because independent claim 30 is clear, independent claim 30 complies with the requirements of 35 U.S.C. §112, second paragraph. Moreover, the use of 35 U.S.C. §112, second paragraph, in place of art to narrow the scope of the claims is not proper.

In section 5A of the Office Action, the Examiner has added new objections to the 35 U.S.C. §112, second paragraph, rejection. Specifically, the Examiner now asserts that it is unclear whether the crowding/spacing data is a distance or a coordinate.

The Examiner is certainly right in postulating that distance could be used as the crowding/spacing data. For example, positive distance between teeth can be used to indicate spacing between those teeth and negative distance between teeth can be used to indicate crowding between those teeth. (Alternatively, depending on the frame of reference, negative distance could instead be used to indicate spacing and positive distance could instead be used to indicate crowding.)

One skilled in the art would understand that the Examiner is not right, however, in postulating that a coordinate can be used as the crowding/spacing data. Instead, one skilled in the art would understand that at

least two coordinates are required for data about the crowding or spacing of teeth.

In either case, the term "crowding/spacing data" is clear. The Examiner merely wants applicant to unnecessarily narrow the claims by reciting a particular form of crowding/spacing data, whereas applicant wants broader protection.

With respect to dependent claims 34 and 40, the Examiner goes on in this section to conclude that the first and second discrepancies are unclear. However, dependent claim 34 merely specifies that the first discrepancy is the sum of the crowding/spacing data of the first table and the second discrepancy is the sum of the crowding/spacing data of the second table. Dependent claim 40 merely specifies that a first initial discrepancy is the sum of the crowding/spacing data of the first table, that a second initial discrepancy is the sum of the crowding/spacing data of the second table, that a first remaining discrepancy is the sum of the first initial discrepancy and other created space, and a second remaining discrepancy is the sum of the second initial discrepancy and the other created space. Because the crowding/spacing data is clear as discussed above,

the discrepancies resulting from summing this data must also be clear.

With respect to the original objection regarding the clarity of the planning, the Examiner in this section again wants applicant to narrow independent claim 30 as indicated above.

In section 3 of the Office Action, the Examiner rejected claims 1-44 under 35 U.S.C. §101 as being directed to non-statutory subject matter.

The Examiner asserts that the claims are not directed to a tangible and useful result. This assertion is directly contrary to State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F. 3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998). In that case, the court found that the transformation of discrete dollar amounts into a final share price produces a tangible and useful result in the form of the final share price that may be at least momentarily stored, that may be fixed for recording and reporting purposes, and that is accepted and relied upon by regulatory authorities and in subsequent trades.

The claims in the present application are direct analogs. For example, independent claim 1 is directed to the transformation of discrete

crowding/spacing and other data related to a patient's teeth in different regions of the patient's jaw into final discrepancies that may be stored, recorded, and reported and that are accepted and relied upon by orthodontists in the practice of their trades. Hence, as in State Street Bank, the invention of independent claim 1 produces a useful and tangible result.

As can be seen, independent claim 1 exactly fits the holding of State Street Bank and, as a result, is directed to statutory subject matter.

Independent claim 14 is similarly directed to the transformation of discrete crowding/spacing and additional data related to a patient's teeth in different regions of the patient's jaw into initial discrepancies and the further transformation of the initial discrepancies and certain other data into final discrepancies that may be stored, recorded, and reported and that are accepted and relied upon by orthodontists in the practice of their trades. Hence, as in State Street Bank, the invention of independent claim 14 produces a useful and tangible result.

As can be seen, independent claim 14 exactly fits the holding of State Street Bank and, as a result, is directed to statutory subject matter.

Independent claim 22 is similarly directed to the transformation of discrete crowding/spacing related to a patient's teeth in different regions of the patient's jaw into discrepancies that may be stored, recorded, and reported and that are accepted and relied upon by orthodontists in the practice of their trades. Hence, as in State Street Bank, the invention of independent claim 22 produces a useful and tangible result.

As can be seen, independent claim 22 exactly fits the holding of State Street Bank and, as a result, is directed to statutory subject matter.

Independent claim 30 is similarly directed to the transformation of discrete crowding/spacing data related to a patient's teeth in different regions of the patient's jaw into discrepancies that may be stored, recorded, and reported and that are accepted and relied upon by orthodontists in the practice of their trades. Hence, as in State Street Bank, the invention of

independent claim 30 produces a useful and tangible result.

As can be seen, independent claim 30 exactly fits the holding of State Street Bank and, as a result, is directed to statutory subject matter.

In section 5B of the Office Action, the Examiner refers to a four step process. Even applying this four step process, it can be seen that the present invention is statutory subject matter. Thus, the present invention (i) is directed to a process, which is one of the categories of 35 U.S.C. §101, (ii) the present invention is not an abstract idea, as is evident from State Street Bank, (iii) the present invention relates to the practical application of orthodontia, again as is evident from State Street Bank, and (iv) the present invention does not wholly preempt all substantial applications, still again as is evident from State Street Bank.

Accordingly, the present invention is directed to statutory subject matter.

In section 4 of the Office Action, the Examiner rejected claims 1-44 under 35 U.S.C. §102(b) as being anticipated by Andreiko. In this section, the Examiner

adds nothing new to the rejection and merely refers to the rejection in the prior Office Action.

Andreiko discloses a system and method for automatically designing custom orthodontic appliances. Final positions of a patient's teeth are derived from digitized information of the anatomical shape of the patient's mouth, and an orthodontic appliance is automatically designed from the digitized shape information and the derived tooth final positions. The appliance is automatically fabricated from the design.

According to Andreiko, the digitized information is generated from measurements of the mouth of the patient, either taken directly or from a model of the patient's mouth, and includes information of the shapes of the individual teeth of the patient and of the patient's lower jaw. The final tooth positions include the derivation of an archform conforming to a skeletal archform defined by the shape of the lower jaw. The appliance is configured in accordance with the shape of this archform. Additional archforms may be constructed using information about the shapes of the individual teeth and the lower jaw skeletal archform to define the positions of the buccal cusps and incisal tips of the

mandibular teeth, the marginal ridges of the upper posterior teeth, and the lingual points of occlusion of the upper anterior teeth to position the teeth according to a preferred treatment plan.

An archwire forming machine is provided to automatically form an arcuate appliance that interconnects the teeth to move them toward their final positions. The archwire forming machine reads input data of the anatomical shape of the patient's jaw and teeth, derives the tooth final positions and the archwire and bracket designs that will move the teeth to the calculated final positions, and generates code to produce the archwire in accordance with the design. A bracket fabrication machine fabricates the brackets based on the final tooth position calculations and the digitized tooth shape data, and determines positions on the teeth to receive archwires that are inclined at computer determined angles.

Independent claim 1 - As can be seen, Andreiko does not disclose a method involving entering cuspid to midline crowding/spacing data, curve of Spee spacing data, midline spacing data, and incisor position data in first and second tables, and entering bicuspid and molar

crowding/spacing data in the second table but not the first table, where the first table relates to the cuspid to midline regions of a patient's jaw, and where the second table relates to the second molar to midline regions of the patient's jaw.

The Examiner, in previously pointing to certain passages of Andreiko, asserts that Andreiko discloses entering the data into a first table that relates to cuspid to midline regions of a patient's jaw and into a second table that relates to second molar to midline regions of the patient's jaw. These passages will be discussed below in the order that they are cited by the Examiner, and it will be shown that none of these passages discloses or suggests entering data in the tables recited in independent claim 1.

Column 12, lines 18-32 state that the various teeth of the patient are identified as T_{JSI}, or T(J,S,I), where J designates the jaw (upper or lower), where S designates the side of the jaw,, and where I designates the tooth by position relative to the jaw centerline.

As can be seen, there is no mention here of the tables recited in independent claim 1.

Column 13, lines 53-68 state that the entry of information into an input computer involves digitizing information to produce digitized anatomical information in machine readable form for analysis by an analyzing computer, that the input computer is connected to a scanner that produces anatomical geometric information describing the patient's teeth and jaw, and that the images [from the scanner] are three-dimensional, or are along a plurality of planes or other surfaces that can ultimately be combined to provide information in three dimensions.

As can be seen, there is no mention here of entering data in the tables recited in independent claim 1.

Column 37, lines 5-18 state that, in order to input data of a patient's mandibular teeth and lower jaw, an image of a mandibular model is first input to a screen of the computer, that a grid G is overlaid on the image as illustrated in Figure 4, that the grid G has grid lines that intersect the image on the screen, and that the operator resizes the grid G, if necessary, and orients the image relative to the grid G in order to define X,Y coordinates with a Y axis on a midline of the

patient's lower jaw and an X axis perpendicular to the Y axis through a selected intersection point or origin 0,0, preferably set at the mesial contact points of the patient's lower central incisors.

As can be seen, neither the image nor the grid form the tables that are recited in independent claim 1. Hence, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Column 17, lines 40-59 state that Figures 3A and 3B illustrate images of two sections of a mandibular digitized model, that such images are rotated to a horizontal plan view, that a derivation of the same information that is available from an imager may be derived, that points may be selected automatically or by an operator from the images for digitization, and that the images may be rotated into other orientations for the derivation of other information.

As can be seen, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Column 15, line 53 to column 16, line 4 state that input information includes a full three dimensional

image that is simplified by reducing it to curves in differently oriented planes or flat curved surfaces each of which is defined in the independent X-Y coordinate system, that these planes are oriented, translated and rescaled to derive ideal finish positions of a patient's teeth and a design of a custom appliance, and that curves and points on the contours of the patient's jaw and teeth are expressed in terms of orthodontic parameters so that orthodontic knowledge and experience and computer analysis can be combined to minimize the use of the orthodontist's time, to shorten the patient's treatment period, and to optimize the final treatment result.

As can be seen, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Column 37, lines 19-35 state that a computer prompts an operator to select tooth contact points and jaw bone boundaries to digitize the X,Y coordinates of the mesial and distal extremities for each mandibular tooth, that the mesial extremity is the point on a tooth closest to the midline along the mandibular arch, that the distal extremity is the point on a tooth closest to the rear of the mouth along the mandibular arch, and that

the mesio-distal width of each tooth I is calculated from the X,Y coordinates using the Pythagorean theorem.

As can be seen, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Column 37, lines 36-51 (column 37, lines 19-35 have been discussed above) state that the mesio-distal widths as calculated using the Pythagorean theorem are summed to calculate the total length required of the arch to accommodate the mandibular teeth, and that, since all teeth will be finally positioned to be in contact with adjacent teeth, this length remains a constant length of any arch on which the mandibular teeth are placed in the calculations.

As can be seen, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Column 39, lines 53-55 state that the input procedure continues, and that coordinates are input for right and left mandibular cuspid cusp tips as illustrated in Figure 4.

As can be seen, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Column 40, lines 2-18 state that coordinates or right and left mesiobuccal cusp tips of the mandibular first molars are calculated, and that the distance between these points is calculated, and that this information is used to determine if and how much the mandibular intermolar distance is to be altered.

As can be seen, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Column 40, line 65 to column 31, line 15 state that coordinates of the central fossae of the maxillary first molars are input, that the distance between the central fossae is calculated, that this information is recalculated after the tooth finish positions are calculated to coincide with the spacing of the mandibular first molars, and that this information is compared with this initial measurement as an indicator of whether the intermolar width will be changed by treatment and of the amount of such change, if any.

As can be seen, there is no mention in this portion of Andreiko of entering data into the tables recited in independent claim 1.

Accordingly, none of the passages from Andreiko cited by the Examiner discloses or suggests entering data into the tables specified by independent claim 1. Andreiko does describe storing data in files. However, a file is not equivalent to a table. Accordingly, Andreiko does not disclose the use of tables. Moreover, there is certainly no disclosure in Andreiko of the specific tables recited in independent claim 1, i.e., a first table containing data relating to cuspid to midline regions of a patient's jaw, and a second table containing data relating to second molar to midline regions of the patient's jaw. Indeed, there is not even a hint of these tables in Andreiko.

Because Andreiko does not disclose or suggest entering data in the first and second tables recited in independent claim 1, independent claim 1 is patentable over Andreiko.

Independent claim 14 similarly recites entering cuspid to midline region crowding/spacing data, curve of Spee spacing data, midline spacing data, incisor position

data, and other created space in first and second tables, and entering cuspid to midline region and molar region crowding/spacing data in the second table, where the first table contains data related only to cuspid to midline regions of a patient's jaw, and where the second table relates to second molar to midline regions of the patient's jaw.

As should be understood from the discussion related to independent claim 1, Andreiko does not disclose or suggest entering data in the first and second tables recited in independent claim 14. Accordingly, independent claim 14 is patentable over Andreiko.

Independent claim 22 recites entering midline and molar relationships into a midline chart, entering crowding/spacing data into a discrepancy chart having first and second tables, and entering data from the first and second tables into an anticipated treatment chart. The first table contains data related only to cuspid to midline regions of a patient's jaw, and the second table relates to second molar to midline regions of the patient's jaw and includes the cuspid to midline regions of the patient's jaw.

As should be understood from the above discussion, Andreiko does not disclose or suggest entering data in the first and second tables recited in independent claim 22. Accordingly, independent claim 22 is patentable over Andreiko.

Independent claim 30 recites entering cuspid to midline region crowding/spacing data in a first table, entering second molar to midline region crowding/spacing data in a second table, and planning an orthodontic treatment based upon the crowding/spacing data entered into the first and second tables.

As should be clear from the discussion of Andreiko, Andreiko does not disclose or suggest entering data in the first and second tables recited in independent claim 30. Accordingly, independent claim 30 is patentable over Andreiko.

Because independent claims 1, 14, 22, and 30 are patentable over Andreiko, dependent claims 2-13, 15-21, 23-29, and 31-44 are likewise patentable over Andreiko.

In section 5C of the Office Action, the Examiner again points to column 13, lines 53-68 as a teaching of entering data in both a cuspid to midline

table and a second molar to midline table. However, this portion of Andreiko does not disclose entering data in this manner.

Instead, column 13, lines 53-68 merely state that information is entered by digitizing the information to produce digitized anatomical information in machine readable form, that a scanner produces the anatomical information, and that the images produced by the scanner either are three-dimensional or are along a plurality of planes or other surfaces that can ultimately be combined to provide the information in three dimensions.

There is no mention here of organizing the data as recited in the rejected claims.

The Examiner goes on to argue that, in Figure 4 and in column 37, lines 5-18, Andreiko teaches inputting data and grid lines. According to Andreiko, Figure 4 is a geometric diagram that illustrates the video image input screen of Figure 3 and that contains variables relevant to the digitization of data from the video image.

Applicant cannot see in Andreiko's Figure 4 the tables recited in the claims of the present application.

As pointed out in applicant's response to the first Office Action, column 37, lines 5-18 merely state that a grid G is overlaid on the image of the patient's mandibular teeth and lower jaw, and that the operator resizes the grid G and orients the image relative to the grid G in order to define X,Y coordinates with a Y axis on a midline of the patient's lower jaw and an X axis perpendicular to the Y axis through a selected intersection point or origin 0,0, preferably set at the mesial contact points of the patient's lower central incisors.

This grid neither shows nor suggests a cuspid to midline table and a second molar to midline table recited in the independent claims of the present application.

The Examiner also argues that this grid G represent the tables of the independent claim. However, applicant can find no data entered into the boxes of this grid. Figure 4 does include various reference letters. However, these letters are not in the boxes of the grid and are merely used to denote points and distances with respect to the mandibular teeth. These letters are not data and they are not in the grid G.

In fact, Andreiko does not teach that the grid is a table. Instead, the grid G is merely a convenient tool to establish a coordinate system for the mandibular teeth.

As can be seen, Andreiko simply does not relate to or teach the invention of the present invention.

Accordingly, the present invention is not anticipated by Andreiko.

CONCLUSION

In view of the above, the claims of the present application are definite, are directed to statutory subject matter, and patentably distinguish over the art applied by the Examiner. Accordingly, allowance of these claims and issuance of the present application are respectfully requested.

Respectfully submitted,

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